

High-Rise Database-Assisted Design (HR_DAD)

DAD Software for Flexible Buildings

How to download and install the software:

The HR_DAD software has been developed using the Matlab language and is available through the internet at <http://www.nist.gov/wind>. All 34 Matlab files required to run the software are zipped into one file, HR_DAD.zip, for a single download. Simply download this zip file and copy the 34 files into a directory whose path is accessible by Matlab. To run the software, simply type 'HR_DAD' at the Matlab command prompt, which runs the script file of similar name and opens ten figure files.

Basics of using the HR_DAD software:

The ten opened figure files (i.e., pages) are used to input the values for the required variables used by the HR_DAD software. All variables are initially assigned an empty set in the HR_DAD.m script file. Variable values can be assigned in any order in pages one through five. The variable names within the software are typically shown in parentheses before the input box on the page. In several instances, a saved Matlab file is opened within a page to load variables that contain vectors or matrices. Purple help icons with a "?" provide the required variable name, the variable size, a description of the variable and the specific organization of the variable's contents.

Once the variables are assigned values by the user, the first portion of the HR_DAD program is run on page six. The results of this first run are saved at the location specified with the 'Save As' button. Tables of peak wind effects must be saved and are used for the second portion of the program that calculates mean recurrence intervals of the wind effects. The results of run two are also saved at a specified location. Graphical output is displayed through page seven, which uses the Output figure file. Page eight allows the user to save the current variable set at any point in the assignment process or load a previously saved set of variables into the software.

A wind speed database is required to estimate the mean recurrence intervals of the wind effect. The simulated hurricane wind speeds are available on the website. Simply save a file to the same location as the software and then specify its milepost in page five as the variable "Hmp". These data are used in conjunction with the tables of peak wind effects in second portion of the program.

Examples for the HR_DAD software

Two examples are provided with the HR_DAD software: 1) a 66-story building with accompanying directional wind tunnel measurements and 2) a single-degree-of-freedom (SDOF) oscillator with a sinusoidal force.

The first example illustrates the full use of the software. The example is downloaded in two stages. The first stage involves downloading the complete set of variables, which are contained

in the zip file named “66-story Example.zip”. Once the files are copied to a location that is accessible by Matlab, run HR_DAD and load the file called “Bldg66_122905” through page eight of the software (see Basics above). This updates all variable values and the displayed values within the pages. The second stage involves downloading the 36 files that contain directional wind tunnel measurements in five degree increments. These files are large and time-consuming to download, but are necessary to estimate the mean recurrence intervals of peak wind effects. A subset of the 36 pressure files can be used bearing in mind that the tables of peak wind effects are calculated for each wind direction (specified through the variable “WD” in page three) and that the directional extreme wind speeds (e.g., simulated hurricane wind speeds mentioned above) are interpolated among these tables of peak wind effects. Thus, the fewer wind directions used, the coarser the mesh of available peak wind effects and the greater the variability in the estimates of mean recurrence intervals. Further details are provided in Section 4.3.1 of this report.

The second example illustrates the ability to easily manipulate the software and obtain a peak wind effect other than the interaction equation for individual members. This example is downloaded through the single zip file named “SDOF example.zip”. Once the files are copied to a location that is accessible by Matlab, run HR_DAD and load the file called “sdof” through page eight of the software (see Basics above). This updates all variable values and the displayed values within the pages. As described in Section 4.3.1 of this report, the wind effect of interest is the maximum deflection of the single mass. This requires slight modification to the script file Program1.m: the maximum deflection should be calculated right after the equations of motion are integrated.